AUTOMATED ANIMAL RETURN SYSTEM

Inventor: Tom Lalor

Attorney Docket: 1013-00029

ANDRUS, SCEALES, STARKE & SAWALL
100 East Wisconsin Avenue, Suite 1100
Milwaukee, WI 53202
Phone: (414) 271-7590
Fax: (414) 271-5770

AUTOMATED ANIMAL RETURN SYSTEM

FIELD OF THE INVENTION

The present invention relates generally to an automated animal return system for controlling animals, including dogs and other pets. In particular, the invention relates to a system for automatically returning such animals to a predetermined containment area.

BACKGROUND OF THE INVENTION

Systems for controlling animals, including dogs and other pets, and causing them to return to a predetermined containment area are known in the art. Typically, these systems use a radio frequency ("RF") signal generator to drive a loop antenna strung out, and perhaps buried, around the boundary of the containment area. When energized, the antenna defines a virtual fence comprising radiating RF signals in the vicinity of the boundary. A matched RF signal receiver is attached to the animal's collar. When the animal approaches the energized boundary antenna, the matched receiver picks up the signal from the antenna and activates an electric circuit in the collar to produce a shock to the animal through electrodes which protrude from the collar into the animal's neck. As an alternative to a shock, a discomforting loud noise can be created, which is intended to annoy the animal and drive it back from the boundary to the containment area. A system exemplary of the above is describe in U.S. Patent No. 3,753,421, issued to Richard M. Peck on August 21, 1973.

Such systems require that the boundary location be learned by the animal. If only a shock is given as the animal approaches the boundary, the animal may become confused as it may not associate the shock with its location near the boundary. Thus, such systems are often combined with flags placed on the boundary and/or an audible sound, to give the animal some warning that it is getting close to the boundary. The animal thus associates the warning and subsequent shock with the boundary area. As the animal learns not to go near the boundary the flags and sound warning are removed.

It is also typical that these systems will increase the intensity of the electric shock or discomforting noise as the animal approaches closer to the boundary antenna.

Another system for controlling animals to remain within a predetermined containment area is described in U.S. Patent No. 4,745,882, issued to Yarnell et al. on May 24, 1988. This system additionally includes a hand-held RF transmitter (or "walkie-talkie") for use by the animal owner, and a matched RF receiver attached to the animal (usually on a collar). The transmitter is capable of sending the trainer's verbal commands to the animal's receiver unit to order the animal to return once it has escaped the containment area.

In U.S. Patent No. 5,207,179, issued to Arthur et al. on May 4, 1993, as the animal approaches the boundary antenna, a prerecorded voice command is transmitted from a control panel to a receiver on the animal's collar to encourage the animal to withdraw from the boundary. A shock is applied to the animal if the voice commands are ignored and the animal approaches closer to the boundary.

Other known containment systems are available that use global positioning systems ("GPS"), ultrasonic signals or accelerometer technologies to locate the position of the animal relative to a containment boundary prior to issuing a warning or administering a shock or some other discomfort.

There are several disadvantages associated with these existing animal return or containment systems. First, all of these systems take a negative reinforcement approach to containment since they only offer punishment or discomfort to the animal, sometimes preceded by a warning tone or voice command. Negative reinforcement can result in the animal becoming confused, nervous and de-motivated. Most animals do not realize why they are being punished. They understand and associate the discomfort with the exact thing they were doing at the time the discomfort was administered. If the animal was looking at a tree, it may be

convinced that the tree produced the discomfort. In most cases the animal will not associate its location near the boundary of a containment area or its disobedience of a command to the discomfort. None of these existing systems offer the animal a positive reinforcement, such as food, patting or commands like "good dog" or clicking as a reward for returning to the containment area. It is well known that positive reinforcement, or reward training, is a much more effective behavioural training method than negative reinforcement or punishment systems and produces less possibility of negative side effects in the animal, such as nervousness, cowering, flinching, crawling, or the like. It would therefore be advantageous to develop an automated animal return system that uses positive reinforcement training.

Second, as noted above, existing systems require that the animal learn the location of containment area boundary lines and that the boundary lines remain relatively fixed. Such learning may take several days or weeks. Therefore, these systems are limited to use in a fixed location and cannot easily be adapted for use when taking the animal away for the weekend on a camping trip. Moreover, it is not easy to change the size of the boundary area. It would therefore be advantageous to have an automated animal return system that could be moved to a new location and where the containment area could be changed in size without the need for the animal to relearn the boundary.

Third, the existing return or containment systems require consistency. You cannot use the systems one day, then the next day, turn them off and play "fetch" with your dog across the containment area boundary line. If you do, the next day your dog will not understand that the system has once again been activated. It will become confused and nervous. It would therefore be advantageous to develop an automated animal return system that could be used intermittently and that does not create confusion or nervousness in the animal.

BRIEF SUMMARY OF THE INVENTION

It is an object of one aspect of the present invention to provide an automated animal return system that overcomes the disadvantages of the prior art.

It is an object of another aspect of the present invention to provide an automated animal return system that uses positive reinforcement training so as to avoid the development of animal confusion and nervousness.

It is an object of another aspect of the present invention to provide an automated animal return system that can be moved to a new location and where the containment area can be changed in size without the need for the animal to relearn the boundary.

It is an object of another aspect of the present invention to provide an automated animal return system that can be used intermittently and that does not result in creating confusion or nervousness in the animal.

According to one aspect of the present invention, there is provided an automated animal return system comprising an initiator for providing an initiating signal; a command system for issuing a command to the animal in response to the initiating signal, the command designed to encourage the animal to go to a reward zone; and a reward system for providing a reward to the animal in response to the initiating signal.

According to another aspect of the present invention, there is provided an automated animal return system comprising a locator system for determining the position of the animal relative to a reward zone, a command system for issuing a command to the animal when the locator system detects that the animal is within a first boundary zone located beyond the reward zone to encourage the animal to return to the reward zone, and a reward system for providing a reward to the animal when the locator system detects that the animal begins to return to the reward zone from the first boundary zone in response to the command.

According to a further aspect of the present invention, there is also provided a method of causing an animal to return to a predetermined reward zone comprising the steps of automatically locating the position of the animal relative to the reward zone using a locating system, issuing a command to the animal when the locating system detects that the animal is within a first boundary zone located beyond the reward zone to encourage the animal to return to the reward zone and providing a reward to the animal when the locating system determines that the animal begins to return to the reward zone in response to the command.

One advantage of the present invention is that it uses positive reinforcement training so as to avoid the development of animal confusion and nervousness. A further advantage of the present invention is that it can be moved to a new location or the containment area changed in size without the need for the animal to relearn the boundary. Another advantage is that it can be used intermittently and does not result in creating confusion or nervousness in the animal if it is switched off for a period of time to engage the animal in other activities. In addition to use as a containment system, the present invention can also be used as an animal feeding system, or a herding system to move animals to a predetermined location.

Further objects and advantages of the present invention will be apparent from the following description, wherein various embodiments of the invention are clearly described and shown.

BRIEF DESCRIPTION OF THE DRAWINGS

In drawings that illustrate the present invention by way of example:

Fig. 1 is a schematic diagram of one embodiment of the present automated animal return system.

Figs. 2, 3 and 4 are top views illustrating the various zones associated with the present invention.

Corresponding reference numerals indicate corresponding parts throughout the various figures.

DETAILED DESCRIPTION OF THE INVENTION

Studies have shown that positive reinforcement or stimulation, such as food (referred to as primary reward reinforcement) is the most effective training method for animals including dogs and other pets. However, there may be times when a negative reinforcement, such as an electric shock or discomforting noise or odor, can be effective, but only if used in conjunction with a positive reward stimulation.

The most effective way to teach an animal to obey a command is to associate the command with an unlearned enforcer or reward, such as food. To train an animal to return or move to a desired location, a command such as "come" is issued and a food reward presented when obeyed, so that the animal associates the reward with its response to the command. Discomfort, or negative reinforcement, should only be used in conjunction with positive rewards.

It is therefore important to understand the difference between a positive and negative reward. Positive and negative rewards can be learned or unlearned. Unlearned positive rewards or reinforcements include food treats or a hand touch such as patting. Learned positive rewards include audible sounds such as a tone, or a "click" or verbal phrases such as "good", "good dog", "good boy" and "good girl" or the like. Negative rewards or punishments include learned verbal phrases such as "bad dog", or unlearned discomforts such as electric shock, painful sounds, discomforting sprays, or the like. Verbal phrases such as "come", "here", "home", "get back", "withdraw", or "sit" are commands and are therefore considered neither a reward or punishment.

The general concept of the present invention is to provide an automated animal return system that primarily uses positive reinforcement and reward rather than negative reinforcement or

punishment. The goal is to have the animal return or move automatically to a predetermined reward area by teaching the animal to obey a command such as "come" or "home".

Referring to Figures 1 to 4, an automated animal return or containment system **10** of the present invention includes an initiator **11** for generating an initiating signal that is received by a command system **30**, which causes a command **32** to be issued to an animal **14**. Command **32** can be any suitable command, such as a verbal command such as "come", "home" or "here", or a whistle that is audible to the animal, but may or may not be audible to humans. Command **32** may be a combination of a verbal command and a whistle, or may include other animal audible commands such as clicks or tones that the animal has been trained to associate with returning to a reward zone **20** (see Figures 2 to 4).

Command system **30** may be any suitable command system capable of issuing command **32** to animal **14**. For example, command system **30** may be a central sound generating system, including a speaker, a sound storage system and a sound amplifier, located within or near reward zone **20**, that is designed to broadcast a prerecorded command **32** in a manner that is audible to animal **14**. In the alternative, command system **30** may include a central radio frequency transmitter located at or near reward zone **20**, combined with a radio receiver and a speaker attached to a collar **50** of animal **14**. A radio frequency signal encoded with command **32** is broadcast by the central transmitter, received by the receiver on collar **50**, and played to the animal over the speaker on collar **50**. In a further alternative, command system **30** may include a central radio frequency transmitter located at or near reward zone **20**, combined with a speaker, a sound storage and playback device, and a radio receiver attached to collar **50**. The central radio transmitter of command system **30** sends a coded signal to the radio receiver on collar **50** that determines which of several stored commands **32** is to be played by the sound playback device on collar **50**. In another similar alternative, discussed in further detail below, playback of command **32** is initiated from a sound generation

chip and speaker attached to collar **50** in response to signals received from initiator **11**.

In a first basic embodiment of the present invention, initiator **11** is a timer that is set to provide the initiating signal at a predetermined time. For example, if return system **10** is being used to herd animals **14**, such as cattle, back to a feeding station located within reward zone **20**, initiator **11** may be set to activate the initiating signal at a predetermined feeding time. Upon receipt of the initiating signal, command system **30** issues command **32**. At the same time, initiator **11** instructs a reward system **40**, located within reward zone **20** to automatically dispense a food reward or treat **43**. When the cattle return to reward zone **20** they are able to eat their primary food reward **43**. In a variation of this embodiment, initiator **11** may be designed to provide the initiating signal once the temperature reaches a certain point, or when the weather changes and it begins to rain, for example.

In another embodiment of the invention, automated animal return or containment system **10** includes an animal locator system **12** to determine when to activate command system **30** and to ensure that animal **14** returns toward reward zone **20** upon issuance of command **32**. Locator system **12** must be suitable for determining the location of animal **14** relative to reward zone **20**, a neutral zone **21**, a first boundary zone **22**, and a second boundary zone **24** (see Figures 2, 3 and 4). The size and configuration of these zones **20**, **21**, **22**, and **24** are adjustable in accordance with the operator's needs. Locator system **12** can be any of several known systems that are currently used to locate the relative position of animals, such as dogs and other pets, including systems that use global position systems (GPS), systems based on radio frequency (RF) technologies including field strengths and RF encoded signals, ultrasonic based locator systems, magnetic direction sensor based systems, or accelerometer based systems, or combinations of one or more of these locator systems. Alternatively, locator system **12** may be comprised of a gate or

series of gates, which may be electronic or mechanical in design, and which are capable of determining when animal **14** passes through the gate in either direction.

In one version of this embodiment, as shown in Figure 2, reward zone **20** represents the area within which animal **14** is to be contained and can be set as desired by the operator. When animal **14** moves from reward zone **20** into first boundary zone **22**, and is detected by locator system **12**, initiator **11** is activated to provide an initiation signal to command system **30**, which issues command **32** to encourage the animal **14** to return to reward zone **20**.

Once locator system **12** detects that animal **14** has returned to, or is moving toward, reward zone **20** within a predetermined amount of time, initiator **11** instructs reward system **40** to automatically give animal **14** a reward. The signal by initiator **11** to reward system **40** can be RF, ultrasonic or infrared, or any other known method of transmitting such command signals.

The reward can be a learned audible reward **42**, such as a click, a tone, a whistle or a verbal phrase, such as "good" or "good boy", or the like. Audible reward **42** can be issued from a speaker located in a central broadcast location or from a receiver/speaker unit or sound generation chip and speaker attached to collar **50**, in a manner similar to that described above in association with command system **30**. Such audible rewards **42** are learned responses and therefore some animals may have to be trained to respond to such rewards before they can be effectively used in the present invention.

In many instances, animal **14** will require a stronger reward, often referred to as a primary reinforcement, such as a food reward **43**. In this embodiment, once locator system **12** detects that animal **14** has returned to reward zone **20** within a predetermined amount of time following the issuance of command **32**, initiator **11**, instructs reward system **40** to automatically provide animal **14** with food reward **43** in the form of an edible "treat".

Automatic food dispensing systems suitable for use in the applicant's invention are known to those skilled in the art and can easily be modified and combined with reward system **40** to dispense food reward **43** at the appropriate time when instructed by initiator **11**. Reward system **40** can be designed to give either the audible reward **42** or the edible treat **43**, or both.

In some cases, smart animals may intentionally go outside reward zone **20**, obey command **32** and repeatedly received the food **43**. Therefore, reward system **40** may include a reward limiter **44** that can be set by the operator to dispense the food reward **43** only at selected times when animal **14** returns to reward zone **20**. For example, reward limiter **44** can be set to permit reward system **40** to dispense food treat **43** only after each tenth time animal **14** responds to command **32** by returning to reward zone **20**. However, animal **14** will always receive audible reward **42** upon return to reward zone **20**. Since the animal has been conditioned to understand that the audible reward **42**, "good dog" or "click", equals the unlearned primary reward, food treat **43**, the animal views the audible reward **42** as equivalent to food **43**. This association is sometimes referred to as a "bridge", since the animal links audible reward **42** to the primary motivator, food **43**.

In another embodiment of the invention, a shown in Figure 4, reward zone **20** is smaller than the desired containment area, perhaps having a radius of ten feet (approximately three metres) or less. A neutral containment zone **21** is located beyond reward zone **20** but within first boundary area **22**. Animal **14** is permitted to remain within neutral zone **21** indefinitely without receiving command **32**. As before, command **32** is issued only once animal **14** ventures into first boundary area **22**, and rewards **42, 43** are not given until animal **14** returns to within the ten foot reward zone **20**. Alternatively, audible reward **42** can be issued once the animal responds to command **32** and begins to return to neutral zone **21** and food reward **43** is dispensed automatically only when the animal returns to within the ten foot reward zone **20**.

In the event that animal **14** does not return to neutral zone **21** or reward zone **20**, as the case may be, within a predetermined amount of time, or ventures beyond first boundary zone **22** into second boundary zone **24** (see Figures 3 and 4), a discomfort system **60** (see Figure 1) provides a discomforting stimulus **62** to animal **14**. The discomforting stimulus **62** may be in the form of an electric shock, delivered to the animal via small electrodes on collar **50**, or some other discomfort, such as a discomforting tone broadcast from a speaker attached to collar **50** or from a central location, or an offensive spray issued from a sprayer attached to collar **50**. If animal **14** obeys command **32** and returns to reward zone **20** or neutral zone **21** after receiving the discomforting stimulus **62** it will be rewarded as before. If animal **14** does not obey command **32**, another command **32** is issued and the location of animal **14** is monitored to determine whether a further discomforting stimulus **62** is required or if rewards **42**, **43** can be issued. If necessary, the intensity of discomforting stimulus **62** can be increased. If after a preselected number of attempts or a predetermined amount of time, the animal fails to respond to command **32** or discomforting stimulus **62**, discomfort system **60** shuts down to prevent further discomfort or possible injury to the animal.

Some animals, like a puppy for example, may require dedicated training to ensure the effective functioning of the return system. Accordingly, the present return system **10** can be set to an optional manual training mode. In the manual training mode, animal **14** is positioned approximately 12 feet (four metres) from the center of reward zone **20** and command system **30** is manually activated by the operator to issue command **32**. Once animal **14** moves into reward zone **20** reward system **40** is manually activated by the trainer to provide audible reward **42**. At the same time, the primary food reward **43** is provided. Gradually, the animal can be placed at farther distances from the center of reward zone **20**. Alternatively, locator system **12** can be used to determine that animal **14** has moved into reward zone **20** in response

to command **32**, at which point initiator **11** sends a command to reward system **40** to instruct it to automatically dispense rewards **42** and **43**.

One significant advantage of the present invention over existing systems is that the present return system **10** can be made portable and easily transported and installed at any location. First, all of the operable systems of the present return system **10**, including initiator **11**, locator system **12**, command system **30**, reward system **40** and discomfort system **60** can be based on technologies that are battery or solar powered and thus transportable to virtually any location. Second, and most importantly, the animal does not have to be trained to understand the location of rigid boundary lines. Animal **14** merely needs to be trained to respond to command **32**. This can be easily accomplished using the present invention in the training mode. One secondary benefit of this feature is that the size of reward zone **20**, neutral zone **21**, first boundary zone **22**, and boundary zone **22** can all be made adjustable and varied at any time by the operator as desired.

The operation of one embodiment of the present automated animal return system will now be described in further detail with reference again to Figures 1 to 4. In this embodiment, locator system **12** is an RF based system comprising a central RF locator-transmitter preferably placed within reward zone **20** and a RF locator-receiver mounted on collar **50** attached to animal **14**. The intensity of the RF signal detected by the collar-mounted locator-receiver is proportional to the distance of animal **14** from locator-transmitter in reward zone **20**. The size of reward zone **20**, neutral zone **21** and first and second boundary zones **22, 24** can be easily varied by the operator according to requirements. Once locator system **12** determines that animal **14** has ventured into first boundary zone **22**, initiator **11**, also located on collar **50**, causes command system **30** to issue command **32** to animal **14** to encourage the animal to return to reward zone **20**. Command **32** may comprise the word "come" or "here" or "home". Command **32** is a

pre-recorded command issued from a sound generation chip and speaker located on collar **50** as well. Once the collar mounted locator-receiver detects a change in the RF signal strength from the central locator-transmitter, indicating that animal **14** has started to move toward neutral zone **21**, initiator **11** causes reward system **40** to issue audible reward **42**, which may issue from the same collar-mounted sound generation chip and speaker used to issue command **32**. At the same time, initiator **11** may cause reward system **40** to dispense food reward **43** from a food dispenser located within reward zone **20**. This can be accomplished using an ultrasonic signal sent from the collar-mounted speaker, or other known methods, such as infrared or RF signals. In situations where animal **14** does not respond to command **32**, and locator system **12** determines that the animal has moved into second boundary zone **24**, a collar-mounted discomfort system **60** can issue discomforting stimulus **62** to animal **14** in the form of an electric shock, discomforting sound, offensive spray or the like.

Since the signal from the central RF locator-transmitter can be received simultaneously by multiple collar-mounted RF locator-receivers, the above-described automated animal return system may be used to automatically monitor and contain multiple animals within a predetermined containment area. Audio reward **42** and discomforting stimulus **62** may all be based on systems mounted on the individual animal's collar **50**. To ensure that only the designated animal **14** receives food reward **43** when responding to command **32**, the size of reward zone **20** can be reduced to a smaller radius of perhaps one foot. Advantageously, the present invention, when used with multiple animals in a single containment area, will permit the removal of a single animal **14** from the containment area by simply deactivating that animal's locator system **12**, perhaps using a remote device.

It will be appreciated by those skilled in the art that only certain configurations of the present invention have been illustrated herein by the applicant, but that other configurations and designs, that fall within the scope of the present invention,

as herein described by the applicant, are possible. It is therefore likely that the invention may be embodied in other specific forms without departing from the spirit or essential characteristics of the invention. The present embodiments are to be considered as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes that come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.